Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

THE
Journal of the Society of Arts,
AND OF
THE INSTITUTIONS IN UNION.

110th Session.] FRIDAY, JULY 15, 1864. [No. 608. Vol. XII.

Proceedings of the Society.

CANTOR LECTURES.

"On Chemistry Applied to the Arts." By Dr. F. Crace Calvert, F.R.S., F.C.S.

Lecture II.

Delivered on Thursday Evening, April 7th, 1864.

Gelatine, Glue, Bone-size, Chondrine, their preparation, chemical properties, nutritive value, and application to arts and manufactures. Artificial tortoiseshell. *Isinglass*, its adulterations and adaptations to the clarification of fluids. *Skins* and the art of tanning.

As the syllabus will show you, I intend to draw your attention, especially in this lecture, to gelatinous substances, as well as to the art of tanning. There are four distinct gelatinous substances obtained on a commercial scale from animal tissues and bones, viz.,—*Osseine*, which I mentioned in my last lecture, *Gelatine*, *Chondrine*, and *Isinglass*.

Osseine, as already stated, is the animal matter existing in bones, and no doubt it is the same substance which also exists in skins, both during life and when recently removed from the animal. It is characterised by its insolubility, its inability to combine with tannin, and lastly, the facility with which it undergoes a molecular change, and becomes converted into gelatine, slowly, when boiled with water at 212°, rapidly, when boiled under pressure at a higher temperature, and very gradually under the influence of putrefaction.

Gelatine is a solid semi-transparent substance, which absorbs water in large quantities (40 per cent.), becoming thereby transparent. It is very slightly soluble in cold water, but very soluble in boiling water; and this solution has the characteristic property of forming a jelly on cooling. So powerful is gelatine in soldifying water, that one part of gelatine will form a jelly with 100 parts of water. It has been observed that gelatine loses this valuable property if boiled for a long time at ordinary pressure, or if carried to a temperature above 223° F. Before examining the interesting action of acids upon gelatine, allow me to mention that whilst solid gelatine resists putrefaction for a long time, its solutions have a tendency to putrefy rapidly, but I have the pleasure to inform you that a few drops of a substance called carbolic acid will prevent putrefaction for a long period. Gelatine dissolves readily in acetic acid, of moderate strength, or vinegar, and this solution, which is used as glue, has the useful property of remaining fluid and sound for some time. But a Frenchman, named Demoulin, has introduced of late years in Paris a solution of glue which is superior to the above and to that in common use, because it does away with the trouble of constantly heating the glue-pot. His process consists in melting one pound of best glue in one pound of water, and adding gradually to the two one ounce of nitric acid of sp. gr. 1·36, heating the whole for a short time, when the fluid glue is prepared. The action of concentrated nitric acid on gelatine is most violent, giving rise to several compounds, amongst which may be cited oxalic acid. The action of sulphuric acid on gelatine is important in a scientific point of view, as an alkaloid called leucine is produced, as well as a sweet substance, called glycocolle, or sugar of gelatine. Gelatine is distinguished from other organic substances by the following chemical reactions:—it gives a white precipitate with alcohol, also with chlorine, none with gallic acid, but one with tannin, or tannic acid. The properties of this precipitate are most important to us, as it is on the formation of it in hides that we ascribe their conversion into leather. The relative proportion of these two substances (gelatine and tannin) in the precipitate varies with the respective proportions brought in contact, but precipitates containing as much as 46 per cent. of tannin have been examined. It is insoluble in water, and presents the invaluable character of not entering into putrefaction. Beautiful fancy ornaments have recently been introduced in Paris by M. Pinson, called artificial tortoiseshell, which he obtains by melting, at a moderate temperature, gelatine with a small amount of metallic salts, running the whole into moulds, staining the mass with hydro-sulphate of ammonia, so as to produce an imitation of the grain of tortoiseshell. The objects so produced are then polished and ready for sale. Before entering on the manufacture of various qualities of gelatine, I should wish to state that there can be no doubt, from the researches of Magendie, as well as from the Report of the Commission appointed by the Netherlands Academy of Sciences, that gelatine as food possesses no nutritive value whatever. Allow me now to give you a rapid outline of the methods followed in the manufacture of various qualities of gelatine. The first quality of gelatine is prepared by taking the clippings, scrapings, and fleshings from the tanyard, treating them with lime water or alkali, to remove any smell and certain impurities. They are then well washed and left in contact for a day or two with a solution of sulphurous acid. They are then placed in a suitable apparatus with water, and heated, when the osseine is converted into gelatine. This is run into a second vessel, and a little alum added, to throw down any impurities that may be in suspension. The liquor is now ready to be run into another pan, where it is concentrated to the necessary consistency, so as to become solid, when it is run into wooden moulds. Eighteen hours afterwards the gelatine is turned out of these moulds on to a wet slab, where it is cut into slices by means of a copper wire; these slices are placed on wire gauze frames, and left in a drying shed until they are perfectly dry and ready for the requirements of trade. The second quality of gelatine is prepared by placing bones in large cylinders, and allowing high-pressure steam to arrive at the bottom of the cylinder, which rapidly converts the osseine of the bones into gelatine, and the removal of this is facilitated by allowing a stream of hot water to enter the upper part of the cylinder. The solution of gelatine thus obtained is evaporated, and is usually employed for the preparation of glue. A third quality is prepared by treating bones with hydrochloric acid (as referred to in my first lecture), and submitting the osseine thus obtained to the action of steam. Lastly, a fourth quality of gelatine, called bone-size, is manufactured by boiling more or less decayed bones, as imported from South America and elsewhere, the flesh of dead animals, &c., and concentrating the solution to the consistency required for the various applications it receives in commerce. [The lecturer then described the mode of obtaining the beautiful thin coloured sheets of gelatine used in photography and other fancy purposes, and also the characteristics which distinguished good from bad glues.]

Chondrine, or cartilage gelatine, first noticed by Messrs. Müller and Vögel, Jun., is interesting as possessing qualities, not only different from those of gelatine, but such as injure the quality of the latter when mixed with it. In fact it gives precipitates with acetic acid, alum, persulphate of iron and other salts; and as gelatine is often used in connexion with these substances, it is easy to foresee how these precipitates may interfere with its application. On the other hand, the quality possessed by this peculiar gelatine, may, I think, render it serviceable in the art of calico printing, for fixing colours, or as a substitute for albumen or lactarine. Thus, the solution of chondrine and acetic acid may be mixed with any of the new tar colours, and the whole printed, allowed to dry, and steamed; the acetic acid will be driven off, leaving the colour fixed by the chondrine on the fabric. Chondrine is prepared by submitting to the action of heat and water the cartilaginous tissue of animals or the bones of young animals.

Isinglass is obtained from the air-bag or swimming-bladder, of several kinds of fish, especially those of the sturgeon tribe, and, although imported from various parts of the world, the principal supplies are from Russia, from whence the best qualities come, which bear the names of Beluga, Volga, or Caspian Sea leaf. Brazil, New York, the East Indies, and Hudson's Bay, also supply various qualities of this valuable substance. It also reaches this country in different states, viz., in leaf and in honeycomb, that is, the bag is cut open, cleaned, and dried; and the quality called snow-bleached is enhanced in value by having been buried in the snow on the banks of the Volga for a long period, by which the isinglass is whitened. Pipes, purses, and lumps are bags which have been cleared but not opened; and a quality called ribbons is made by rolling the bag and cutting it into strips before shipping it to this country.

I shall now endeavour to explain to you how the beautiful preparations before you, for which I am indebted to the kindness of Mr. James Vickers, are obtained. The leaf bladder is first softened in water, and rolled out, under high pressure, into thin leaves, which may extend to several feet long; these in their turn are drawn under a number of revolving knives, making 1,000 revolutions per minute, by which 6,000 of the well-known fine threads are produced in every minute. This quality is chiefly used for culinary purposes. For commercial uses the purses or lumps above mentioned are chiefly employed. These are soaked in water for two or three days, cut open, certain useless parts removed, further softened, rolled, and cut into various dimensions, according to the requirements of trade, their chief use being the clarification of beer and other alcoholic fluids, for which gelatine cannot be employed, because it dissolves in water whilst isinglass merely swells. The result is that the highly-swollen and extended mass, when poured into beer, wine, or other alcoholic fluids, is on the one hand contracted by their alcohol, and on the other hand it combines with their tannin, forming an insoluble precipitate, which, as it falls through the liquor, carries with it the impurities in suspension, and thus clarifies the fluid. As isinglass is very slow in swelling out in water, brewers employ an acid fluid for the purpose, but, strange to say, instead of using pure acetic acid, many of them take sour beer, and thus run the great risk of spoiling their sound beer. I have known instances of great losses occurring in this way, acetous fermentation having been thus spread through an entire brewery during the summer months. As a large quantity of gelatine, cut into shreds, in imitation of isinglass, is sold at the present day, it may be useful to know that detection is very easy, by the following method:—Place a small quantity in hot water, in which gelatine will readily dissolve, whilst isinglass will do so very slowly. I cannot conclude the examination of this interesting class of substances without drawing your attention to the fact that osseine, gelatine, chondrine, and isinglass present marked differences in their textures and general properties, although their chemical compositions may be considered identical, thus:—

	Osseine.	Gelatine.	Chondrine.	Isinglass.
Carbon	50·4	50·0	50·61	50·56
Hydrogen ...	6·5	6·5	6·58	6·90
Nitrogen ...	16·9	17·5	15·44	17·79
Oxygen	26·2	26·0	27·37	24·75

Esculent Nests.—I must not omit to mention, in connection with this interesting class of substances, these curious gelatinous products, which are not only considered great delicacies in China, India, but even in Europe, where they realize from £3 to £7 per pound; considerable quantities are imported into England. It has long been a disputed question what is the chemical nature of the substance composing these nests, which are the product of a peculiar kind of swallow; but Mr. Payen, by his recent researches, has left no doubt in the minds of chemists that it is an animal, not a vegetable matter. In fact, it is a peculiar mucous substance, secreted by the bird, and composed of carbon, hydrogen, oxygen, nitrogen, and sulphur. Further, it is insoluble in cold water, but soluble in boiling, and differs from gelatine and isinglass in that it does not gelatinize as it cools.

Skins.—Skin consists of two principal parts, one a mere film, called the epidermis, and the other constituting the bulk of the skin, and called the dermis. There are also found in skin a large quantity of blood-vessels, and a small quantity of pigment cells, which hold the colouring matter. Further, the skin contains a small amount of nerves and a number of glands, among which may be cited the sebaceous glands or follicles, which are intended to secrete the unctuous matter constantly accumulating upon the skin, and keeping it soft and pliable; then there are the perspiratory glands, which play a most important part in the physiological construction of the skin. These are so numerous that Mr. Erasmus Wilson has calculated that there are 3,528 of them in a single square inch of human skin, so that in an ordinary sized body there are no less than 2,300,000 of these pores. But still the most important part of the hide for us is that called the "dermis." The skins of animals are commercially divided into three distinct classes. The hide is the name given to the skin of full-grown animals, such as oxen, horses, and buffaloes; and these are further sub-divided into fresh hides, that is to say, those which are obtained from animals slaughtered in this country; dry hides, that is, hides which have been dried in the sun, and which are principally imported from South America; dry salted hides, principally from the Brazils, where they are salted and then dried in the sun; and salted hides, which are preserved in Monte Video and Buenos Ayres by salting them, and which are shipped, embedded in salt, to this country. The composition of a fresh hide may be considered to be as follows:—

Real skin	32·53
Albumen	1·54
Animal matters soluble in alcohol... ...	0·83
Animal matters soluble in cold water... ...	7·60
Water	57·50
	100·00

A second class of hides is that called kips, which are skins flayed from the same kinds of animal as the foregoing, only when young. Thirdly, the term skin is applied to those of small animals, such as the sheep, goat, seal, &c

I will now endeavour to give you an idea of the preparation which hides undergo to fit them for the art of tanning. These operations are four. The first consists in washing off the dirt from the hide, softening it, if a dried one, or removing the salt, if salted. The second has for its object the removal of the hair, which is effected by two or three different methods. The most usual plan is to place the hides in large vats, containing a weak milk of lime, for two or three weeks, care being taken to remove and replace them every other day, after which time the hair is sufficiently loosened to be removed. A second plan consists in piling up the hides, allowing them to enter slightly into a state of putrefaction, and then placing them in weak milk of lime, so as to complete not only the loosening of the hair but also the swelling of the hide, for lime also possesses that property. Another process, which is called the American plan, is to hang the hides in pits for two or three weeks, keeping them at a temperature of 60° and constantly wet, when the hair can be easily removed. Weak alkalies are sometimes substituted with great advantage for lime in the above processes, and this plan is certainly the best, as it does not leave in the hide any mineral residue, as is the case with lime, either in the form of an insoluble soap of lime or of carbonate, both of which are highly objectionable in the subsequent process of tanning, as they act on the tannic acid of the tan; facilitating its oxidation, and thereby rendering it useless. Depilation of hides is sometimes effected by the employment of weak organic acids; thus the Calmuck Tartars have used from time immemorial sour milk for that purpose. In some parts of France, Belgium, and Germany, the unhairing of the skins is also effected by an acid fluid, produced by the fermentation of barley meal, which gives rise to acetic and lactic acids. To carry out this process generally speaking five vats are used. In the first the hides are cleaned; in the second they are softened, and the hair and epidermis prepared for depilation; and the third, fourth, and fifth are used to swell and give body to the hide. This operation, which is called white-dressing, does not work so well as lime for heavy hides, as it swells them to such an extent as to render them unfit to prepare compact leather. When the hair can be easily pulled off, the hides are placed on a convex board, called a beam, and scraped with a double-handed concave knife, which not only removes the hair, but a large amount of fatty lime-soap and other impurities from the hides. The third operation consists in fleshing the hides, by shaving off all useless flesh, fat, and other matter by means of a sharp tool. The fourth operation is called swelling or raising the hide, the purpose of which is the following:—First, the removal of any lime or alkali which may remain in the hide; and secondly, to swell or open the pores of the hide, so as to render them better adapted to absorb the tannic acid of the tanning liquors. This is effected by dipping the hides in weak spent tanning liquors, or liquors which have lost the tannic acid, but which contain more or less of gallic acid, for not only do all tanning matters contain gallic acid, but its proportion is greatly increased during the operation of tanning, by a process of fermentation which goes on during that operation, and which converts tannic acid into gallic acid and a peculiar sugar.

The Tanning of Hides.—The old process of tanning consisted in placing layers of wet tan and of hides alternately, and after two or three months removing the whole from the pit and replacing the old by fresh tan. These operations were repeated until the hides were tanned, which took from eighteen months to two years, owing to the difficulty of the tannic acid reaching the interior of the hide. Of late years the process of tanning has been greatly shortened by treating the bark with water, and steeping the hides in the liquor, first weak and afterwards strong. By this means good leather can be obtained in the space of eight or ten months. More rapid tanning, but probably giving inferior leather, is effected by employing, in conjunction with, or as a substitute for, bark, a decoction of dividivi, valonia, myrobalan, catechu or terra japonica, gambia, &c. Many efforts have been made of late years to apply the laws of hydraulics, as well as several physical and physiological principles discovered by eminent philosophers, with the view of shortening the period of tanning, but as I believe that none of them have received the general sanction of the trade, I shall confine myself to giving you an idea of the most successful ones. The first attempt to accelerate the process of tanning consisted in forcing the tanning fluids into the substance of the hide by means of hydraulic pressure. Mr. Spilbury, in 1831, employed a process which consisted in making the hides into sacks, and plunging them into a tanning liquor, and as the fluid percolated through the skin into the interior of the bag the air was allowed to escape. By this means a certain amount of time was saved in bringing the tanning liquor in contact with the various parts of the skin. Mr. Drake soon followed in the same direction, his plan being to sew hides together, forming bags, which he filled with a solution of tan; and to prevent the distention of the skins by the pressure of the liquid within, they were supported in suitable frames; as the pores became gradually filled with tannin, artificial heat was applied to increase the percolation of the fluid. Messrs. Chaplin and Cox's process is also very similar to the above, the difference being that the tanning fluid is placed in a reservoir, and allowed to flow into the bag of hides through a pipe, the fluid being thus employed at pressures varying according to the height of the reservoir. The bag of hides is at the same time plunged into a solution of tannin to prevent excessive distention. Messrs. Knowles and Dewsbury have recourse to another principle to compel the percolation of the tanning liquor through the hide. To effect their purpose they cover vessels with hides, so as to form air-tight enclosures, and, having placed the tanning fluid they employ on the hides, the vessels are exhausted of air, and atmospheric pressure then forces the fluid through the skins into the vessels below. Mr. Turnbull's process, being an imitation of that used for tanning Morocco leather, need not be described. Attempts have been made from time to time to mineralize hides, that is to say, to substitute for tanning, mineral salts, as will be described in my next lecture, when speaking of the art of tawing skins. The processes which have attracted most notice in this branch of the art of preparing leather are those of Messrs. D'Arcet and Ashton, M. Bordier, and M. Cavalier. M. Bordier's plan is that of dipping hides in a solution of sesqui-sulphate of iron, when the animal matters of the hide gradually combine with a basic sesqui-sulphate of iron, rendering the hide imputrescible, and converting it into leather. M. Cavalier's method is to dip hides first into a solution of protosulphate of iron, and then into one containing alum and bichromate of potash. A chemical action ensues by which the protosulphate of iron is converted into a persulphate, combining with the animal matter, and by its preservative action, together with that of some of the alum, the hide is converted into leather. I think, however, that I shall be able to satisfy you, from the results of many examinations of leather and hides which I have made, that there are good and sufficient reasons why most of these processes have necessarily failed. Inventors have been led to believe, by the statements of many eminent physiologists (as can be proved by reading some of the most recent works on that science), that skin is composed of blood-vessels, glands, &c., plus gelatine, and that if by any mechanical contrivance the tanning liquor could be brought into contact with this gelatine, the leather would be tanned; and many ingenious schemes have been devised, and much money expended to obtain that result. The fact, however, is that there is no gelatine in skin, for if there were, when hides were placed in water, the gelatine would be dissolved and washed away. But what is supposed to be gelatine in the hides is in reality the isomeric substance called osseine or one greatly resembling it. The great discovery to be made in the art of tanning, therefore, is that of a chemical or fermentative process, by which the isomeric change (that of the osseine into gelatine) may be rapidly produced, instead of by the slow putrefactive process which occurs in the old method of tanning. Further, I would observe that to convert a hide into leather it is not sufficient that the whole of its animal matter be combined with tannin, for the leather thus obtained would present two great defects; 1st, the hide would not have increased in weight, and the tanner's profits therefore would suffer; 2ndly, the leather would be so porous as to be useless for many of the purposes for which leather is required. The reason of this is, that when, after a period of several months, the osseine has been converted into gelatine, and this has become thoroughly combined with tannin, a second series of reactions is necessary to render the leather more solid and less permeable to water, and to increase materially its weight. These reactions constitute what is called feeding the hide, and are brought about by leaving it to steep in more concentrated tanning liquor for a considerable period; and this necessary process, beneficial to the wearer as well as to the producer, appears to me to be that which offers the greatest impediment in the way of shortening the period of tanning. The hides as they leave the tanning vat require several operations before they are ready to be used for soles, or to be curried for various commercial purposes. They are first slightly washed and placed in a shed to partially dry, and are then rubbed with a brush and rough stone on the face of the leather, or hair side, to remove any loose tanning material that may remain on the surface; but this rubbing is not applied to the back, as buyers attach great importance to the peculiar appearance called the bloom, which enables them to judge of the goodness of the tanning. The tanned hides are again slightly dried, and oiled on the face, and then submitted to the pressure of a roller passed over the surface, which has the effect of rendering the leather more flexible and the surface perfectly uniform. These operations are repeated two or three times, when the leather is ready for soles. Before the tanned hides intended for shoe-soles are considered fit for that purpose, they must be slightly compressed and softened, so as to again diminish their permeability to water. This was formerly effected by beating with a hammer called the mace, but of late years this slow process has been superseded by compressing machines; and I believe those most appreciated in the trade were invented by Messrs. Cox and Welsh, and Messrs. Iran and Schloss.

Proceedings of Institutions.

◆

Hyde Mechanics' Institution.—The twelfth annual report for last year says that during the past year the Institution has not only maintained, but advanced its position, notwithstanding the almost unexampled trade depression. The Directors speak of the irreparable loss which the Institution has sustained by the death of its founder and munificent patron, the late Benjamin Goodfellow, Esq. The number of members was:—Honorary, 16; annual, 37; ladies, annual, 7; of quarterly and weekly members, the average was about 150. The library has been removed to the ground floor, in order to facilitate the exchange of books, and 79 works have been added during the past year. Besides new books, there has been a large contribution of new and valuable works from the Hyde Book Club, connected with the Institution. The room lately occupied as the library has been adapted as the reading room, and some improvements have been effected. The Directors, hoping to increase the usefulness of the news room, arranged with the General Electric Telegraph Company to furnish telegrams; but the supply has been so intermittent and unsatisfactory as not to be of benefit to the Institution. During the past year the evening classes exhibit a nearly four-fold increase in attendance and receipts over the previous year. An interesting female class has been established. It began with the attendance of the monitresses from the educational department of the Hyde Relief Board's Sewing School, and the progress they made during the few months they attended was considered satisfactory, and induced the hon. secretary of the sewing school, Charles Hibbert, Esq., to distribute several handsome book prizes to the most proficient. The subjects taught were:—reading, English grammar, arithmetic, writing, geography, English history, and household accounts. The visiting agent of the Lancashire and Cheshire Association paid a visit to the Institution, and, having made an examination of the pupils, he expressed his gratification at their attainments. The attendances at the lectures have been good, and the general results satisfactory. A dahlia show was held in September. Concerts and a theatrical performance by the gentlemen amateurs of Manchester were given with success. Besides the evening classes for elementary instruction, it has been arranged to open, in one of the unused rooms of the building, a middle class boys' day school, with a view to supply a felt educational want; and the school, if successful, will prove a small auxiliary to the funds of the Institution. The balance sheet shows an expenditure of £278 11s., and the balance due to treasurer is £6 8s. 2½d., having been reduced from £39 15s. 11d. This result has been brought about principally by the donations received for use of the lecture hall, and other parts of the building. The receipts from the evening classes have increased from £3 19s. 10d. to £14 4s. 4½d. during the year. The directors suggest to their successors to seek the further development of the evening classes, by adding new subjects of instruction, and also by seeking to increase the attendance at those already in existence; also to make some special effort to secure a much larger number of the operative class, so as to make the Institution more really a Mechanics' Institution than it is at present. A movement is springing up in the country which the next directorate may fall in with; to provide a room (where working men may attend in their working dress) as attractive and cosy as possible; where, besides being able to read suitable newspapers, they may enjoy friendly conversation, or hear a song, or recitation. The room should be provided (says the report), with piano, bagatelle table, and various games, as backgammon, chess, and draughts, &c. Here, as in a superior kind of free-and-easy, the working men would have access to society, amusement, and instruction; and if, in addition to occasional attendance at the club-room, the younger members could be induced to take up some subject of study, and systematically pursue it, the usefulness of the Institution would be increased.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Thirty-fourth Meeting of the British Association for the Advancement of Science will commence in Bath on Wednesday, the 14th of September, 1864, under the Presidency of Sir Charles Lyell, M.A., LL.D., D.C.L., F.R.S., and the following are the arrangements for the meeting:—

The General Committee will meet on Wednesday, the 14th of September, at 1 p.m., for the election of sectional officers, and the despatch of business usually brought before that body. On this occasion there will be presented the report of the Council, embodying their proceedings during the past year. The General Committee will meet afterwards by adjournment. The first general meeting will be held on Wednesday, the 14th of September, at 8 p.m., when the President will deliver an address; the concluding meeting on Wednesday, the 21st of September, at 3 p.m., when the Association will be adjourned to its next place of meeting. At two evening meetings, which will take place at 8 p.m., discourses on certain branches of science will be delivered. There will also be other evening meetings, at which opportunity will be afforded for general conversation among the members. The Committees of Sections will meet daily, from Thursday, the 15th of September, to Wednesday, the 21st of September, inclusive, at 10 a.m. precisely. The Sections will meet daily, from Thursday, the 15th of September, to Tuesday, the 20th of September, inclusive, at 11 a.m. precisely. Reports on the progress of science, and of researches entrusted to individuals and committees, and other communications intended for presentation to the Sections, are expected to be forwarded in letters addressed to the Assistant-General Secretary, at Bath, previously to the meeting, accompanied by a statement whether the author will be present, and on what day, so that the business of the Sections may be satisfactorily arranged. The reports complete, and concise abstracts of other communications, are to be delivered to the Secretaries of the Sections before which they are read, previously to the close of the meeting, for publication in the Transactions. As the reports on Science may be interesting to more Sections than the one which originally called for them, it is desirable that the authors should be prepared to furnish the means of reading them in any other Section at the request of the President and Secretaries of that Section. The following are the titles of the Sections to which communications may be presented:—Section A. Mathematics and Physics. B. Chemistry and Mineralogy, including their applications to Agriculture and the Arts. C. Geology. D. Zoology and Botany, including Physiology. Sub-Section D. E. Geography and Ethnology. F. Economic Science and Statistics. G. Mechanical Science.

At the first meeting of the General Committee it will be proposed by Dr. Hunt, "That Section E. shall include Geography, Ethnology, and Anthropology." An Index to the volumes of Reports of the British Association, from 1831 to 1860, is printed, and will be issued to those members who have subscribed for it, at 12s., carriage included.

EXAMINATION PAPERS, 1864.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in April last:—

ARITHMETIC.

THREE HOURS ALLOWED.

No marks will be allowed for answers where the working is not shown.

1. Find by practice, using only one aliquot part, the value of 537 articles at £9 17s. 6d.

2. In payment of the rent of a field of 10 acres, 2 roods, 16 poles, at £1 19s. 5d. per acre, I received 6 cwt. 3 qrs. 19 lbs. of sugar, worth £3 1s. 7d. per cwt., how much money must I return? *Work by Practice.*

3. If it take $12\frac{1}{3}$ yards of cloth to make 5 coats, and $2\frac{1}{2}$ yards to make 2 waistcoats, how many yards will it require to make 7 coats and 8 waistcoats?

4. How much will $\frac{8}{9}$ of $78\frac{3}{8}$ yards amount to at 5s. 3d. for $\frac{2}{5}$ of $1\frac{3}{4}$ yards?

5. What fraction of a guinea and a half added to £3 16s. 9d. will amount to £4.

6. A merchant owes a certain sum; he pays severally £25 6fl., £36 9fl. 6c., £27 8fl., £38 5fl. 8c. 3 mils, and £46 7c. 2 mils, and receives back £5 1c. 5 mils; required the amount of his debt.

7. The smaller of two sums is £74 1fl. 8c. 5 mils; their difference is £2 9fl. 6c. 3 mils; express the larger amount in the common currency.

8. If a person pay £12 3s. 9d. for income-tax, when the tax is 7d. in the pound, what extra sum will he pay when the tax is 16d. in the pound?

9. If 18 per cent. of an army be killed in battle, and 14 per cent. of the remainder desert, and 21,156 men be left, what was the original strength of the army?

10. If a ship be insured for $91\frac{3}{8}$ per cent. of its real value, and the whole value of the ship be £6,968, what would a person lose who owned $\frac{2}{5}$ of the ship?

11. By selling an article for £19 the seller loses 5 per cent. on the outlay; what would be the loss or gain per cent. if he sold it for £23 15s.?

12. I lent £184 12s. $9\frac{1}{2}$d. on the 12th of March, what interest is due on the 5th of August at $2\frac{1}{2}$ per cent. per annum?

13. I bought an article for 25 guineas cash, and sold it the same day for 30 guineas, allowing 6 months' credit, what was my gain per cent?

14. From a field 328 yards long and 300 yards wide, how many gardens could be formed, each 144 feet long and 75 feet wide?

15. A room is 18 feet 7 inches long, 14 feet 3 inches high, and 14 feet 3 inches wide; what will it cost to paper its walls, the paper being 3 quarters wide and costing $2\frac{1}{4}$d. a yard, deducting for 4 windows each 12 feet high and $3\frac{1}{2}$ feet wide?

16. By selling sugar at 8d. per lb. I clear $\frac{1}{8}$ of my outlay; if I then raise the price to $9\frac{1}{4}$d.; what do I clear per cent. upon my outlay at the latter price?

17. The prices of a 1st and 2nd class ticket from London to Bath are £1 6s. 10d. and 19s. 10d, respectively, and a person taking 2 second class tickets and 1 first class ticket from London to Reading, on the same line, pays 19s. for the three; find the price of each ticket.

18. The populations of 3 towns in the year 1851 were respectively 42,652, 84,648, and 13,412; in 1861 it is found that the first two had increased 12 and 10 per cent. respectively, and the last had decreased 18 per cent. Find the *average* population of the three towns at the latter period.

19. A sold a piece of cloth to B, who at first offered him 5 per cent. profit, but A got him to give a shilling more than his first offer, by which he found that he had cleared $8\frac{1}{3}$ per cent.; find the amount for which A bought and sold the cloth.

20. A person sells £1,000 consols at $94\frac{7}{8}$, and on their rising he sells £1,000 more at $95\frac{3}{8}$; on their rising again he buys back the whole £2,000 at 96; what does he gain or lose on the transaction?

21. If 27 grains of gold gild a ball weighing 729 oz., how many grains will gild a ball that weighs 1,728 oz.?

BOOK-KEEPING BY DOUBLE ENTRY.

THREE HOURS ALLOWED.

1. In what does the difference between the single entry and the double entry method consist?

2. What is the special advantage possessed by the double entry over the single entry method?

3. What should a profit and loss account exhibit?

4. What should a balance sheet exhibit?

5. Journalise and post, in proper technical language and form, the following imaginary facts and transactions, and draw out from the ledger a trial balance, a profit and loss account, and a balance sheet:—

James Bell and John Lee enter into partnership on the 1st January, 1864.

James Bell's capital was—						
In Cash	£2,000	0	0			
In Cotton	1,000	0	0			
John Lee's capital was—	3,000					
In Cash	£1,000	0	0			
				£4,000	0	0

N.B.—The capital of the partners bears interest at 5 per cent. per annum, and the net profits are divisible between them in equal moieties.

Subsequent Transactions.

1864.

Jan. 2.	Bought of R. Black cotton as per invoice	£700	0	0
,,	Accepted R. Black's draft at 14 days due 19th inst.	700	0	0
3.	Sold to Sam. Bow cotton	360	0	0
,,	Received from Sam. Bow his acceptance, due 7th Feb.	200	0	0
	and cash	160	0	0
4.	Bought of S. Tom cotton as per invoice	800	0	0
5.	Paid cash to S. Tom	792	10	0
,,	Abatement allowed by S. Tom	7	10	0
,,	Bought of James Trig cotton as per invoice	600	0	0
,,	Received of James Trig bill, receivable, due 15th inst.	210	0	0
6.	Sold to Sam Bow cotton	700	0	0
,,	Received of Sam Bow his acceptance, due 9th February	250	0	0
,,	Advanced for petty cash	10	0	0
8.	Bought of R. Nix, Manchester, cotton goods as per invoice	670	0	0
,,	Sold to H. Pott cotton as per invoice	480	0	0
12.	Consigned to Ceylon, through Braine and Co., for our own account and risk, cotton goods, invoiced to them at	1,000	0	0
,,	Received of Braine and Co., cash advance on said consignment	666	0	0
13.	Paid to James Trig cash	450	0	0
,,	Cash paid freight and charges on shipment to Ceylon	58	10	0
,,	Paid out of petty cash, postage, &c.	3	17	6
14.	Discounted with D. Gride Sam. Bow's acceptance for £250, due 9th Feb., received cash	248	15	0
	Allowed discount	1	5	0
16.	Bill receivable, received of James Trig, 5th instant, due 15th instant, returned dishonoured	210	0	0
17.	Cash drawn out by James Bell	250	0	0
,,	,, ,, by John Lee	100	0	0
19.	Cash paid our acceptance of R. Black's draft, due this day	700	0	0
,,	Cash placed on deposit at bankers	1,000	0	0
20.	Bought of R. Nix, Manchester, cotton goods as per invoice	325	0	0
,,	Paid R. Nix, Manchester, cash on account	400	0	0
	Our acceptance, due 10th March	200	0	0
24.	Paid out of petty cash for stationery, &c.	4	10	0
31.	Stock of cotton on hand	1,800	0	0
,,	Cotton goods on hand at cost	325	0	0
,,	Salary due to D. Scribe	21	0	0
,,	Rent due to R. Tree	15	0	0
,,	Balance of interest to credit of James Bell	11	17	6
,,	,, ,, John Lee	3	15	0

ALGEBRA.

THREE HOURS ALLOWED.

(A.)

1. Find the greatest common measure of the two quantities, $x^2 - 3x + 2$, $x^2 - x - 2$.

2. Prove that the sum of any two positive quantities must be greater than twice the geometrical mean between them.

3. Multiply $a^2 + b^2 + c^2 - ab - ac - bc$ by $a + b + c$.

4. Find the least common multiple of $6x^2 + 3x - 9$, $2x^2 - 9x + 7$.

5. Express the number 1864 under the form of a series, $a + 5b + 5^2c + 5^3d +$ etc., in such a manner that a, b, c, d, etc., shall be each *positive and less than* 5.

6. Given $\sqrt{5} = 22{\cdot}3606798$; find, *without division*, the value of $\frac{3}{\sqrt{5} - 2}$ and $\frac{\sqrt{5} - 2}{\sqrt{5} + 2}$

7. Solve the equation system:

$$\frac{2}{x} - \frac{1}{y} = \frac{1}{z}, \quad \frac{2}{y} - \frac{1}{z} = 5, \quad \frac{2}{z} + \frac{1}{x} = 4,$$ and the equation, $$\frac{9 + 4x^2}{3 + 2x} + \frac{9 - 4x^2}{3 - 2x} = 12.$$

8. The sum of an arithmetical series is 90, the common difference 3, and the first term 22. Find the value of the middle terms.

(B.)

9 If A, B, C, D, are 4 points, so situated on a right line that AD, BD, CD, are in harmonic progression, prove that DA, CA, BA, will also be in harmonic progression.

10. If 6 prizes are to be distributed between 4 classes, find in how many different ways the distribution can take place.

11. Find the value of the nth term in the expansion of $\frac{1}{\sqrt{1-x}}$ by the binomial theorem.

12. If $x^2 + bx + c = 0$, be an equation in which b, c, are positive or negative integers, show that the equation cannot have a finite fractional root, and show in what manner this rule may be extended to the equation $ax^2 + b + c = 0$, where a, b, c, are all of them positive or negative integers.

(To be continued).

Fine Arts.

◆

Fine Arts in France.—The accounts of the late Annual Exhibition of the works of living artists have just been published, in outline, and it appears that the total sum taken at the doors was 110,000 francs. The Exhibition was open from the 1st of May to the 15th of June, deducting Sundays, when admission was gratis, thirty-nine days; this, at one franc a head, gives an average attendance on the pay days of 2,820, or little more than two persons to three works of art exhibited; this is certainly a poor result. It must be mentioned, however, that great liberality is exhibited towards the artists, students, and the press, who all have their *entrées* during the whole course of the Exhibition. The number of catalogues sold is stated at 28,000, or one, or nearly one, for every four visits. The refreshment *buffets*, and cane and umbrella stalls, produced to the management about 150,000 francs. This money has been spent in purchases for the national collections. The Luxembourg Gallery, which has been closed for some days for repairs and re-arrangements, is now re-opened, with from thirty to forty new works, principally from the late Exhibition.

Publication of Sketches of Eugene Delacroix.—M. Alfred Robaut, of Douai, has just issued the first volume of a very remarkable work, consisting of admirable lithographic copies of Delacroix's best sketches. The volume issued, which is in folio, contains twenty-seven lithographs, including the famous Arab cavaliers, studies of lions and other animals, "Joseph and Potiphar's Wife," "Death of Lara," Jacob and the Angel," the "Education of Achilles," "Hamlet and Laertes at the Grave," and other well-known specimens. The second volume of this interesting work is in progress. The name of the possessor of each of the sketches engraved is attached—a useful indication in more respects than one.

Ingres Exhibition.—M. Ingres, the patriarch of French Art, has for some years abstained from public exhibition, the last time of his appearing being in 1855, but he has just thrown open his own atelier, on the Quai Voltaire, to all lovers of art who will take the trouble to obtain an introduction. The exhibition consists of five works—a "Portrait of Madame Ingres;" "Homer led by a Child," said to be an old sketch recently carried out; "La Vierge Médiatrice;" "Turkish Women at the Bath;" and "The Golden Age." The last is almost a reproduction of a work executed by M. Ingres at the Duc de Luyne's charming chateau at Dampierre. "The Scene in the Bagnio" is one of the most daring works of the artist. The paint on these canvases is scarcely yet dry, and in the corner may be seen the following signature:—"J. D. Ingres, Ætatis LXXXIIII!"

Copyright in Engravings.—The Association for the Protection of Publishers report the total number of piracy cases placed in the hands of the solicitor, or coming to his knowledge, up to the 31st of May, 1864, was 104; of these 97 were piracies by photography, and 7 by lithography. To maintain the publishers' rights, it has been necessary to bring 27 actions, and to institute proceedings in the police court on one occasion. In the residue of the cases, the offenders have paid the expenses and a nominal penalty, promised not to offend again, and signed the declaration to that effect, with a heavy penalty in default. In the cases where actions have been brought, the defendants have paid the costs and small penalties, which have been credited to the proprietors of the several copyrights, and in these cases also the pirates have signed the declaration. In all instances the delinquents have delivered up, to be destroyed, the pirated copies remaining in their possession.

Copyright.—The Select Committee on the Bill in the House of Commons have reported that, considering the difficulty and complication of the inquiry, they are not prepared to recommend any amendments or consolidation of the law of copyright, without information, which, at this advanced period of the Session, it is hardly practicable to acquire. They recommend that the whole question be referred to a Select Committee next Session.

Manufactures.

Steam Boiler Explosions.—The engineer's monthly report for May, presented to the Manchester Association, says that during the previous month 226 engines have been examined, and 402 boilers, 16 of the latter being examined specially, and 1 of them tested with hydraulic pressure. Of the boiler examinations, 287 have been external, 18 internal, and 97 thorough. The following defects have been found in the boilers examined:—Furnaces out of shape 2 (1 dangerous); fracture, 8 (2 dangerous); blistered plates, 2; internal corrosion, 11; external corrosion, 9 (3 dangerous); internal grooving, 8; external grooving, 4; feed apparatus out of order, 1; water gauges ditto, 9 (1 dangerous); blow-out apparatus ditto, 9; fusible plugs ditto, 2; safety-valve ditto, 1; pressure gauges ditto, 11; deficiency of water, 1; total, 78 (7 dangerous). Boilers without glass water gauges, 5; without pressure gauges, 2; without blow-out apparatus, 22; without back pressure valves, 22. Six explosions have occurred during the month, by which 11 persons have been killed, and 13 others injured. None of the boilers were under the inspection of the Association. One of the explosions, by which one person was killed and two others injured, occurred to the boiler of a locomotive engine, while standing at a short distance from a railway station. The locomotive, which was employed on goods traffic, and had six wheels coupled, was of the ordinary construction, and about ten years old, having been re-tubed two years since. The cylindrical portion of the boiler, as well as the crown of the outer fire box shell, was rent into a number of pieces; while many of the tubes were fractured, and the remainder bowed outwards. The cause of the explosion was attributed, at the inquest, by three successive witnesses, all of whom were practical boiler-makers, to shortness of water and consequent overheating of the plates. This, it was thought, had produced a gas inside the boiler, which, upon ignition from the hot tubes, caused the explosion. A personal examination of the exploded boiler led, however, to a very different conclusion. The crown of the inner fire-box, as well as its sides, were found uninjured, and the roofing stays in perfect condition; while the rents, instead of being in the fire-box, which would have been the case had the plates been overheated, were confined to the external shell, as already described; so that it is clear that the explosion was not due to shortness of water. On further examination, it was found that the character of the water was somewhat corrosive, and the surface of some of the plates had been eaten into indentations by it; while close to the overlap at a longtitudinal seam of rivets, at the left hand-side of the cylindrical portion of the boiler, and in the ring of plates nearest to the smoke box, a deep furrow was found to have been eaten, which ran longtitudinally more than half way across the width of the plate. At this furrow, which was below the water line, the plate had rent, and there can be little question that this rent was the primary one from which the others developed, and to which the explosion had been due; so that the supposition of shortness of water, as well as that of the formation of explosive gases, and the neglect of the engine-driver, may be dismissed, and the explosion attributed simply to weakening of the plates through the furrowing action, which is found to be more or less developed in nearly all boilers, but more especially in locomotives. In another explosion, which also occurred to a locomotive engine, the shell rent at the base of the steam dome, which was shot upwards, and thrown to a considerable distance. From this opening a number of rents radiated, and the upper part of the cylindrical portion of the shell was rent into several pieces. Various considerations left little room to question that the primary rent had occurred at the base of the steam dome, where the ring of angle iron, with which it was attached to the shell, was found to be severed for a considerable distance through the line of rivet holes. This explosion is considered, therefore, to have been due to the existence of the steam dome, and that, had it not been for this, the explosion would not have occurred. The danger of these steam domes has been frequently pointed out to the association; and this explosion, which is by no means singular, affords an additional illustration of the importance of dispensing with them altogether, at all events, in stationary boilers. A good deal of misconception, says the reporter, exists with regard to their efficiency; they are considered by some to make a valuable addition to the amount of steam room within the boiler, and thus to compensate for irregular loads upon the engine. The fallacy of this, however, may be simply shown. Few steam domes exceed by more than four times the capacity of the engine cylinder, so that, even if the dome could be entirely exhausted, it would work the engine but a few strokes; while the entire space above the water line in a Lancashire boiler, 7 feet in diameter and 30 feet long, contains but little more steam than the amount generated every minute when in ordinary work. Again, one foot of chamber room, filled with 60 lb., will only yield four feet at atmospheric pressure; whereas, one cubic foot of the water, which would be of a temperature of 309 degrees Fahrenheit, would yield considerably above one hundred cubic feet of steam at atmospheric pressure. So that a boiler worked at a pressure of 60 ℔. a foot of space, filled with water, has stored up within it more than thirty times as much power as one filled with steam. From this it will be clear that the reservoir of power is not in the steam, but in the water. In order to prevent priming, all that is necessary is to take the steam off at a number of points, and not to allow a concentrated rush at any one. To effect this, horizontal perforated pipes, carried along within the steam space, which are so widely known, are found to be most efficacious. A considerable number are at work in the boilers under inspection, and give very satisfactory results. Steam domes also are inconvenient. Railway companies frequently refuse to transport boilers with them on. Also, they are an obstruction in getting new boilers into place, and in removing old ones where the head-way is limited, and have to be cut off altogether where it is necessary to revolve boilers in their seats so as to bring the bottom upwards for repair. Again, leakage is constantly found to arise at their attachment to the shell.

Commerce.

◆

Rivers in Relation to Trade and Health.—A paper on this important subject, by M. C. Grimand, of Caux, has been read before the Academy of Paris by M. Dumas. Starting with the theorem—axiom one might almost say—of M. Peligot—"That the water of rivers which traverse the grand centres of population become more impure in proportion to the development of industry, for while the mass of the water remains the same, the causes of impurity become daily more abundant"—the author sets forth the following self-evident principles as regards the Seine:—"That water for consumption should be taken from the river above and not below the city; that the organic matter which mixes with the water of the river takes a long time to destroy; and that the supplies of water for domestic purposes and for cleaning of the streets should be kept separate." The last dictum of course only applies to cases such as that of the Seine, where the source of the water applicable to the former use is not sufficient for both. The water used for the streets of Paris is drawn, not from the Seine but from a canal; this is supplied through pipes to the *fontaines* in the street, and also to all the better houses, while the water of the Seine is still generally furnished by the carriers, who obtain it from the city reservoirs, where it is filtered, and carried in pails, at a great cost, to the consumers. M. Dumas, who is President of the Municipal Council of Paris argues for the completion of the great drainage system (*égout collecteur*), and demands that agriculture shall be put in possession of "those products without a name, which are at the same time so dangerous yet so valuable, and at once elements of life and of death." This is, he says, the great problem of the present day for Paris as it was the other day in London! M. Dumas, in pleading for the improvement of his own capital, naturally enough makes the best use of what has taken place elsewhere, and, at the same time does not spare his contemporaries at home. He says: "If hygienic science had been thoroughly understood when Paris was enlarged, the great houses erected would have been constructed on a plan more favourable to the health of their inhabitants—the rooms would not have been made so small, or with so little light, and the kitchens would not have been made to look into wells;" and, "on what principles," he asks, "are the boulevards and public monuments disfigured by arrangements which offend both the eye and the nose, while the air is vitiated by the concentration of poisonous products?" M. Dumas regards the sullying of the waters of a river not only as an enormous error, but as an act which must sooner or later be remedied; and he asks who shall estimate the cost in human life and suffering of the putrid exhalations of the Thames at low water, when the sewers were emptied into it, or of the effect of the wretched condition of the smaller arm of the Seine on the old city which it washes. The necessity of emptying the sewers of Paris into the river below the city is naturally insisted on, and is self-evident; and every sanitary reformer will endorse the dicta of M. Dumas, who says:—"Everywhere, the practice of adulterating streams by the contents of sewers should be put a stop to; such products should be collected with care, and the bad effect of the decomposition got rid of by their application to agriculture;" and he points to Flanders, Savoy, but most especially to China, as the countries where the greatest care has been bestowed on the collection and application of these "elements of life and death." M. Dumas dwells with proper pride on what has already been done in Paris, but, he says:—"In order to maintain the purity of air or of water, the most scientific and practical systems alone will not suffice, even when perfectly carried out; it is absolutely necessary to grapple with and overcome all the opposition which private interests, affecting an ignorant disdain for science, and mistrusting her recommendations, set up in favour of routine and against the public good."

Cotton.—Messrs. Smith, Edwards and Co., in their circular for June, say:—A marked resemblance is observed between the position of the market now and at this time last year, and it is anticipated by many that the course of prices in the autumn months will be similar. Last year a drooping market in the spring and summer was succeeded by a great increase of the consumption in the autumn, an active trade in Manchester, and an advance in prices of 6d. to 8d. per lb.; this year the improvement commenced in April, and to that extent the revival due in the latter part of the year has been forestalled. But the absorption of Cotton, both in this country and the Continent, is proceeding at a pace which threatens to run stocks very low in the autumn, if not interfered with by other causes. The consumption is going on at the rate of 8,000 or 10,000 bales per week above last year; the export is fully as large, and the supplies available for the next few months promise but a small increase on last year. The last accounts from Bombay (our chief source of supply for the remainder of the year) are more discouraging than any yet received, for it appears that a large portion of the new crop, especially Broach and Dhollerah, must remain in the interior until after the monsoon, *i.e.* till October or November. This is partly owing to organized efforts among native speculators to keep up prices in Bombay, and partly to the long-continued bad accounts going out from this market in the spring, which stopped purchases in the interior and clogged the wheels of business. In addition to this, the G. I. P. railway, which is the great avenue of trade to the Oomrawuttee districts, has fallen out of repair, and suspended the carriage of cotton, so that much of that crop must also lie over till after the rains. For these various reasons it is not thought now that any material increase can take place in the shipments of Cotton till near the end of the year, and the export for some months to come is not expected to be greater than last year. From Calcutta and China a moderate increase of shipments is taking place, and the next Madras crop is expected to be larger, but it is only beginning to arrive, and scarcely counts into this year's supply. The crop in Egypt is thought to be drawing near a close; the excessive prices ruling of late have drained the interior, and it appears likely that less remains to be shipped than after this date last year. From the Brazils and America we see no reason to anticipate any material alteration from the quantities received in the latter half of last year, so that, looking broadly at the question of supply, we see no ground to anticipate other than a very moderate increase for the next few months over last year, certainly not more than sufficient to meet the enlarged consumption. But last year the stock steadily diminished till it reached 150,000 bales in the beginning of November, so that the present relations of supply and demand point likewise to a great diminution this year, if nothing occurs to disturb their natural development. It must be remembered, however, that the platform of price from which we start is much higher than last year. Then it was 21d. per lb. for American and Egyptian Cotton, and 17d. for fair Surat; now it is 28d. for the former and 22d. for the latter. There is besides an uncertain future to the money market, and the full expectation of renewed pressure later in the year; whereas last season no uneasiness was felt on that score till the beginning of November. These considerations, combined with the anxiety more or less avowed about the course of American affairs, will go far to neutralize the effect of a scarcity of the raw material, and perhaps prevent the advance that would otherwise occur; still it must be allowed that the general sentiment of the trade points at present to higher prices, especially for the better stapled classes of cotton; with respect to them it is sufficient to observe that the stock on hand is 100,000 bales, against 156,000 last year; the quantity expected for the next few months no greater, and the consumption nearly double what it was at this time last year.

Colonies.

PRICE OF BREAD IN VICTORIA.—A Melbourne paper says:—"The application to the Government to appoint a commission to discover the cause of the failure of the wheat crop, very naturally recalls the attention to the consequent revolution in the price of bread that has created so much consternation already in Victoria. Happily we are better prepared than any community in the world to hear with comparative stoicism the cry of dear bread. The variety of our resources for food and sustenance has made us comparatively independent of the loaf, and though we never can forego the claims of the staff of life, yet as long the market gardener and the butcher can afford to dispute his supremacy, the tyranny of the baker over our appetites can never be absolute and undivided. The inconvenience felt by us in famine prices in bread, there is a satisfaction in feeling, is the smallest possible. The earnings of labour elevate it beyond the temptation of bread riots. In the old country a great increase in the price of flour means a great increase in crime. For ourselves we are exempt from the calculations and apprehensions associated with this; in most wheat-growing countries the price of labour is measured by the value of food which labour consumes—wages fluctuate with the fluctuations in the price of bread. But in this country wages have never fallen in the same ratio as bread. The present price of bread will therefore well diminish the profits of labour, but it will not disable the labourer. The labouring class, in proportion to the salaried class, is, at this moment, over-paid; and though the labouring class, in common with the whole community, must experience the effects of a higher market, yet the class who will feel it most are the small fixed annuitants. But after all, the endurance of either party will not be tried very long or very severely. With so many foreign markets to depend on the article must be attracted by the high prices from our neighbours to our own, and the re-adjustment of prices to their normal standard ensue as a consequence. Though the bakers announce the prospect of another rise in their manufacture there is no doubt that the mere anticipation will produce an accession of raw material. Competition will open the granaries of the existing holders of flour, even if scarcity and want have failed to open their hearts. Shipments are on the road from California."

NATURAL HISTORY SOCIETY OF MONTREAL.—The annual meeting of this society was held at Montreal, on the 18th May. A general resumé of the papers read during the last session was given, and special attention was given to the importance of Dr. Hunt's communication on the earth's climate during the palæozoic period. Dr. Tyndall's experiments would seem to prove that a small per centage of carbonic acid and an additional amount of aqueous vapour, diffused through the atmosphere, would largely economise the solar heat by preventing radiation. In this way the high and equable temperature in the northern, temperate, and subarctic zones, which the flora of the cool period would appear to imply, may perhaps be explained. Attention was then called to the most important scientific fact in the year, the publication of the "Geology of Canada." This was an achievement of which the members of the society might feel proud, as it might be said to emanate from their body. He should only call attention to the two points in Canadian geology which it illustrated. The first of these was the finding of definite traces of life in the Laurentian rocks. This formation and the Huronian system were at one time thought to be entirely devoid of fossils. In the Laurentian rocks two series of beds may be observed of different ages. In the lowest of these, fossils have lately been discovered—'Canada thus far distancing all other parts of the world, so far as yet known, in the antiquity of its oldest fossils.' The order of succession in the Laurentian rocks seems to be the same as that so often represented in other parts of the system. In other words, in all rock formations circles of deposit seem to occur, in which the mineral or mechanical composition of the rock undergoes a series of changes. After this the author proceeded to discuss at considerable length the two conflicting theories as to the causes of the peculiar phenomena exhibited in the boulder and drift clays of Canada. The facts which have to be accounted for are "the striation and polishing of rock surfaces, the deposit of a sheet of unstratified clay and stones, the transport of boulders from distant sites, usually to the north-east, and the deposit on the boulder clay of beds of unstratified clay and sand, containing marine shells." He then stated that he considered the view which ascribes these and other appearances to the action of a "sheet of glacier, several thousand feet thick," upon dry land, to be untenable in the majority of cases. The hypothesis which he was inclined to accept was that which supposes a general subsidence and re-elevation of the land in North-east America, together with the action of the sea and its currents, accompanied at certain seasons with floating ice.

POPULATION OF NEW SOUTH WALES.—The following is the official return showing the estimated population of the colony on the 31st December, 1863:—

	Males.	Females.	Persons.
Population, 30th June, 1863	206,156	165,004	371,160
Increase by births............	4,152	3,927	8,079
Increase by sea	5,881	2,685	8,566
Total	216,197	171,636	387,833
Decrease by deaths	1,780	1,196	2,977
Decrease by departure......	4,774	1,143	5,917
	6,554	2,339	8,894
Population, 31st Dec., 1863	209,643	169,297	378,939
Increase on the half-year ...	3,487	4,293	7,779

At present there are no means of ascertaining the number of persons arriving and departing from the colony across the border.

TELEGRAPHS IN NEW SOUTH WALES.—The only telegraphic works at present in progress in this colony are three branch lines, which are being carried out under an arrangement with the residents in the several districts that the Government shall receive five per cent. on the outlay. On the line from Braidwood to Queenbeyan a distance of fifteen miles has been cleared, and holes for the posts have been sunk for a distance of thirteen miles. The posts are all erected on the line from Deniliquin to Hay, and fifteen miles of wire are stretched. The line from Wellington to Dubbo has been commenced. The estimates for 1864 being at length passed, tenders will shortly be called for new lines for which money has been voted. These consist of extensions from Mudgee to Murrurundi, and from Braidwood to Araluen, and the continuation of the line to Cooma.

Notes.

The Prince Consort's Birthday.—A letter has been addressed, by command of the Queen, to the Council of the Royal Horticultural Society, saying that, "Considering the interest the Prince Consort always took in this garden, and how much the society owes to his active support and assistance, it would be exceedingly gratifying to her Majesty if the Council shall resolve that his birthday, which falls on the 26th August, should from henceforth be observed by the society as a holiday on which free admission to the gardens should be allowed to the public." This suggestion the Council have adopted, and will take "immediate steps for arranging that the 26th August in each year shall be kept henceforward by the society as a holiday, in the hope of assisting towards bringing to the mind of the present and future generations the virtues of the Prince, and his great services, especially to the working classes."

Newspaper Stamp Duty.—Mr. Abel Heywood, who last year was mayor, and at the last election was nearly elected one of the members for Manchester, has issued the following address to his friends upon the occasion of taking his eldest son into partnership:—"When, in 1831, I commenced the business of newsagent, the periodical press had barely an existence, and no newspaper published in England sold for a less price than sevenpence, the duty upon each paper being fourpence. The *Poor Man's Guardian*, published by Mr. Henry Hetherington, was commenced in 1830, and in 1831 he offered me the agency for Manchester and the district. The size of the *Poor Man's Guardian* was not equal to one half of the *Family Herald*; it was, in fact, a demy sheet, and sold for one penny. The judges in the law courts decided that this small sheet, so unlike a newspaper, was one, and as such ought to pay the stamp duty. It was during the year that an organised struggle of friends of the people commenced for the abolition of the stamp duty, or the removal of the 'tax on knowledge.' In the five years during which this struggle was maintained, 750 persons were fined and imprisoned by the magistrates for vending the *Poor Man's Guardian* and the unstamped press. In the month of March, 1832, the authorities at the Stamp Office in Manchester instituted a prosecution against myself for vending the *Poor Man's Guardian*, and I was committed by the presiding magistrate for the space of four months to the New Bailey Prison. The contest between the Government and the publishers became very severe, the parcels for the country agents were seized by the police and confiscated, servant girls carrying bonnet and other boxes were stopped and searched, the coach offices in London were besieged by the police to capture every suspicious-looking parcel; but the ingenuity of the publishers was a match for them. My parcels were often put in hampers in which shoes are usually packed, and directed to a shopkeeper in Oldham-street who dealt in those articles. In referring you to these circumstances, I desire to tender my most unfeigned thanks to those members of the trade now living who, from the first year of my entering into business, have never ceased to be my steadfast friends. To the trade collectively I venture to express my heartfelt thanks for the encouragement and support they have always given to me, and, at the same time, to express a hope that under the new partnership their favours will be continued. I have now only to say that time has made me a much older man than I was. Like most men who have climbed the hill and faced the breeze for a third of a century, I have lost some of the activity of youth; yet my hair is not grey, nor my health broken, and I still feel a pride in believing that no greater educational engine was ever launched than the Freedom of the Press."

Permanent Exhibitions in Paris.—For some years the French mind, so fertile in ideas, and so apt at organisation, has been bent upon the application of the principle of exhibitions to the commercial wants of industry and art, and in spite of the want of success that has at present attended all such schemes in Paris and elsewhere, new undertakings of the kind are constantly springing up, and at the present moment there are more than one that deserve and attract attention. The *Union Centrale des Beaux Arts appliqués à l'Industrie*, which organised a very successful exhibition last year, has taken premises in the curious old square known as the Place Royale, which is situated in the very heart of the manufacturing quarter of Paris. The intention of this society is, in the first place, to form a museum of the best examples of art-manufacture from all countries and of all periods, for the benefit of the artists and artizans of France, and also a library of such books as may aid the student in his artistic and industrial studies. The library is already partly formed and thrown open to the public for which it is destined. This is a most praiseworthy institution, and cannot fail to be of essential service if well carried out. Another exhibition, of a somewhat different character and on a much larger scale, will be opened in the course of the present month in the Rue Laffitte, in the centre, at once, of the monetary and artistic world; close to the great auction mart where amateurs dispute the possession of the works of genius, and also close to the fashionable highway, the Boulevard des Italiens. This establishment aims at commercial objects through the medium of a permanent exhibition, and there is every appearance of the intention being carried out with spirit. The locality chosen is the famous old mansion of Jacques Laffitte, situated at the junction of the street which bears his name with the Rue de Provence. This house was the head-quarters of the revolution of 1830, and in the *grand salon* was drawn up the draft of the Charter. At that time it had passed out of the hands of the famous financier, and the republic, as a mark of its gratitude, re-purchased and presented it to its original owner, a fact commemorated by an inscription over the entrance in the court yard. The house contains a large number of rooms, some of them of great size, and retaining all their grandeur of decoration; they are now being fitted up with massive and elegant stands in oak for the reception of the articles to be exhibited, and the court yard on the one hand, and the garden on the other, are being covered with glass roofs, and will make two very spacious halls, surrounded by galleries, and communicating on both floors with the house which stands between them. The upper storey of the mansion is being converted into a kind of club, for the convenience of the exhibitors and others, and includes, besides reading, writing, smoking, and billiard rooms, a salon devoted to the use of ladies, which will be provided with a grand piano. The exhibition is to be open to the public daily, from eleven in the morning till eleven at night; and it is proposed to establish sales twice in the year for the disposal of those articles which are no longer necessary for the purposes of the exhibition. The plan is a bold one, and its approaching maturity renders it worthy of attention.

Interesting Archæological Discovery.—Some excavations made on the property of M. Berryer, at Augerville, have brought to light a stone coffin containing the remains of a human skeleton, and several objects of interest, such as a large bowl in bronze with gadroon ornaments; fragments of a silver bowl much oxydized; a large chased gold ring, of the time apparently of the Lower Empire; some fine coloured glass beads, broken glass vases, and a piece of silver money of the Emperor Gratian. The position of this tomb, on the edge of a very ancient road, leads to the supposition that it was not isolated, and M. Berryer has commenced a careful examination of the adjoining ground in the hope of discovering a collection of sepulchres belonging to the period of the Roman domination in France.

Correspondence.

Improved Labourers' Dwellings.—Sir,—I desire to call the attention of those who are forming plans to provide improved dwellings for agricultural labourers, to what we have long been doing in Poplar and other places, in what we call Freehold Provident Societies. By them we secure compound interest at the rate of 10 per cent. per annum to our members on their savings, and consider that to be the lowest rate of interest that working men should be content with. A knowledge of the mode of accomplishing this will greatly increase the power of the philanthropist who takes upon himself the task of instructing the lowly. Very much higher rates of interest than this may be obtained by the application of the principles of our Freehold Provident Societies to other purposes, as whatever rate of interest men are paying in any shape for other people's money, or for the use of anything bought with other people's money, that rate of interest they can, by combination, obtain for a certainty on their own savings. For our present purpose I desire to confine my observations to what may be done by that kind of combination which secures interest at the rate of 10 per cent. per annum. Each of our Freehold Provident Societies consists of not less than 100 members, subscribing 9½d. a-week, or £2 1s. 2d. per annum. The 1s. 2d. is set aside to pay the expenses of the society, and the £2 per annum, from each member, is used in the following manner:—Every time the money in the society amounts to £200 the members draw lots for it, and he to whose lot it falls purchases with it £200's worth of freehold or leasehold property, pays back the £200 by repaying £20 per annum for 10 years, and continues his subscription of 9½d. per week for 25 years, by which time the last of the 100 members has had his £200, after which each member has his 25 years' subscription returned to him. Thus each member, for a subscription of £50, obtains property of the value of £200, and receives back also his £50. One only out of every 100 has to subscribe £50 before he has £200. The first has £200 by the time he has subscribed £2, and so on. The last served—the one, if you please, worst off—has his £200 75 years sooner than he could have had that sum if he kept his 9½d. subscriptions in his own possession. Each society, with a subscription of £5,000, buys £20,000 worth of property, and returns the £5,000 to its members. The whole of the £20,000 worth of property is purchased in 25 years, and five years are occupied in returning the subscriptions, making the whole period of the society 30 years. The repayment of 10 per cent. can be reduced to 5 per cent. per annum on the sum advanced, or lower still if required, without the slightest damage to the society. Seventy-five out of every 100 can withdraw from the society without damage to those who remain. Those who withdraw can receive back all they have paid to the society, and hereafter will be able to obtain a good premium from others desirous of purchasing their shares. All the details in the working of these societies have been brought to great perfection by 20 years' practise. The first society will be 21 years old on the 4th of August next. The Saint Luke's Society (London) of which Mr. Wood, of No. 26, Luard-street, Caledonian-road, has been a member since its commencement, has a subscription of 1s. 7d. per week, for £200. It had its last appropriation a week or two ago, and will be 21 years old this autumn. Various societies at Deptford are going on. The earliest of them, established in the autumn of 1843, are now held at the Deptford Literary Institution. A former Lord Mayor of London, Mr. David Wire, was for years the treasurer of the first four or five societies. By this time the societies at Deptford must have appropriated about £30,000. The various societies in Poplar have appropriated about the same sum. Those in Poplar under my own immediate management, have up to this time appropriated £15,610. The first, which began in August, 1843, with 100 shares, has now 41 shares. Each member who has withdrawn has received back the whole of the money he paid in.

Dr.

	£	s.	d.
To the Amount of Subscriptions up to the 27th of June, 1864, paid by the 41 Members remaining in the Society	1,750	18	6
The sum repaid off Appropriations	2,977	0	0
	4,727	18	6

Cr.

	£	s.	d.
By Amount Appropriated.........	4,600	0	0
Expenses for the 21 years.........	120	6	5
Balance	7	12	1
	4,727	18	6

Calculations in great variety have been published long ago, which have been verified in every particular by the working of numerous societies. On these calculations the rules are formed. I enumerate some of the things that our 10th Poplar Society's rules provide for. Any amount may be subscribed. Subscriptions may commence at any time. Members may subscribe for any number of years, from seven to 25. Any member may have, at the end of the 7th year, a sum appropriated to his use exceeding the whole amount he has subscribed. The subscription is 1 per cent. per annum, on the sum to be appropriated to the use of the member. The repayment is 10 per cent. per annum, with power of reduction to 5 per cent., or lower still if required. A great variety of other schemes can be carried on in connection with the society by different sections of the members, without the general and specific business of the society being in any way interfered with. I will give two illustrations of these and conclude: The members of the 10th Poplar Society are divided into three classes. Those who subscribe 10s. a week, those who subscribe 1s. a week, and those who subscribe one-tenth of a shilling or 1¼d. per week. Many shilling shareholders collect from the poor one-tenth of a shilling, and make them the holders of one-tenth of a share, for which each has £25 appropriated to his use; repayment, £2 10s. per annum for 10 years. These sums of £25 can be used to purchase sewing machines, looms, boats, lathes, furniture, pianofortes, to apprentice children, or to purchase plots of freehold ground. Each class of ten 1s. a week subscribers has an appropriation of £250 on an average every 2½ years. The ten composing the class draw lots to ascertain who is to have the £250, but, making such arrangements among themselves previously, if death occurs to a member of that class, the next appropriation that accrues to that class belongs to the survivor of the deceased. Death has drawn the lot. In the case of a widow this can easily be made for her equivalent to an annuity in perpetuity of £20.—I am, &c., T. E. Bowkett.

Poplar, June 29th, 1864.

To Correspondents.

Errata.—In last *Journal*, p. 569, col. 1, line 9, for "of its professors," read "to its professors;" and line 25, for "but the artists having," read "the artists not having."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 8th June, 1864.

Par.
Numb.
347. The Queen, *v.* Bracken and others—Copies of the Informations and Indictments.
350. Electors (Ireland)—Return.

SESSION 1863.

493 (vi.) Import and Export Duties—Return.

Delivered on 9th June, 1864.

359. Colonial Governors—Correspondence.
361. Holyhead Harbour—Further Correspondence.
364. Royal Court (Jersey)—Further Correspondence.
Circassian Tribes—Papers respecting the Settlement of Emigrants in Turkey.

Delivered on 10th June, 1864.

309. East India (Finance and Revenue Accounts).
311. Union of Benefices (Metropolis)—Copy of Scheme.
360. Michael Duigan and others—Memorials.
372. Railways (Deposits of Bonds)—Returns.
130. Bills—Fisheries (Fresh-water).
132. ,, Public and Refreshment Houses (Metropolis), amended.
133. ,, Superannuations (Union Officers).
134. ,, Uniformity Act Amendment.
136. ,, County Constabulary Superannuation.
137. ,, Railway Travelling (Ireland).
140. ,, Game (Ireland) No. 2).

Delivered on 11th and 13th June, 1864.

324. American Vessels—Return.
344. Patriotic Fund—Fourth Report.
354. Navy (Ships)—Return.
355. Malta Dockyard—Additional Correspondence.
362. Navy (Ships)—Returns.
368. Brewers' Licences—Return.
374. Navy—Supplementary Estimate (Vote 10).
158. East India (North Western Frontier)—Return.
322. Fire Engines, &c. (Metropolis)—Return.
341. Transfer of Stock—Accounts.
351. Militia Regiments (Companies, &c.)—Return.
365. Belligerent Cruisers—Additional Instructions to Colonial Governors.
375. Navy (Trials of Coal)—Circular recently issued to the Fleet.
135. Bills—Thames Conservancy (amended).
141. ,, Valuation of Rateable Property (Ireland) (amended).

Patents.

From Commissioners of Patents Journal, July 8th.

Grants of Provisional Protection.

Air or gases, compressing—1510—T. T. Coughin.
Artificial stone, &c.—1504—R. Bodmer and L. R. Bodmer.
Artillery—1475—M. A. F. Mennons.
Beer-engines—1534—J. Holmes.
Boilers, apparatus for feeding—1485—J. Fletcher and H. Bower.
Bottles, &c., stoppers for—1543—T. O. Dixon.
Boxes, card and millboard—1547—T. J. Denne.
Carbonic acid, manufacture of—1498—G. H. Ozouf.
Carburetted hydrogen, &c.—1513—W. H. Tooth.
Carriages—1550—J. Bottomley.
Chemical retorts, &c.—1374—W. Clark.
Cheese-making, apparatus for—1558—C. H. Pugh.
Churns—1542—W. Carrington and T. Turner.
Coal, &c., dividing—1493—R. W. Thomson.
Colouring matters—1525—R. Smith and C. Sieberg.
Cranes, &c.—1194—J. Booth, J. Booth, and J. Booth.
Crinoline and quilted skirt combined—1516—W. Rowland.
Dyeing and printing—1540—C. A. Martins.
Electrical communicators—1565—J. D. Adams.
Felts, manufacture of—1471—J. Reid and T. Buckley.
Fibrous materials, washing or dyeing—1507—W. Clark.
Fibrous substances, apparatus for spinning—1518—W. Whiteley and G. Harling.
Fibrous substances, cleansing and bleaching—1509—J. H. Johnson.
Fibrous substances, machinery for spinning, &c.—1524—J. C. Brentnall and R. Edge.
Fire-arms, breech-loading—1559—T. P. Saville.
Flax, breaking and scutching—1539—E. Rowland and J. Reid.
Flour-dressing, bolter for—1505—G. B. Morris, W. B. Price, and J. L. George.
Frills, &c., machinery for producing—1527—A. Smith.
Furnaces—1552—T. Whitehouse.
Gaseliers—1495—J. Day.
Gas meter, compensating—1499—G. Newton and J. Braddock.
Gas-meters—1561—J. Jones,
Gates for docks, &c.—1530—W. Crozier.
Glass, grinding and polishing—1519—J. H. Johnson.
Guns, breech-loading—1554—J. Aldred and P. Bainbridge.
Iron and steel manufacture—1514—W. H. Tooth.
Land-culture—1483—A. Ellissen.
Lubricating machinery—1373—R. A. Brooman.
Lubricating frictional surfaces—1557—A. Freeman.
Manure, preparation of horny substances for—1489—W. E. Gedge.
Metals, machinery for cutting, &c.—1535—J. Thompson.
Minerals, obtaining—1500—J. G. Jones.
Mirrors, &c.—1520—J. H. Johnson.
Motive power—526—M. Barland and T. O'Keefe.
Motive power, mechanism for obtaining—1492—S. Young.
Motive power (steam combined with air)—1065—J. Parker.
Moulded surfaces, coating with composition—1515—T. Agnew.
Obstructions at dock entrances, &c., removing—1404—G. Migotti.
Ordnance, mounting and operating—1420—W. E. Newton.
Paper manufacture—1391—E. Ledger.
Paper manufacture—1566—T. Cullin.
Peat, machinery for treating—1511—J. Hodges.
Pile-drivers—1512—J. J. Bennett.
Projectiles—1517—E. M. Boxer.
Projectiles—1521—T. T. Coughin.
Pulley or sheave block—1531—T. Worsdell.
Pumps—1273—F. Noble.
Railways, apparatus for lessening the effects of collisions on—1502—W. Clark.
Railway chairs and sleepers—1494—M. A. Muir and J. McIlwham.
Railway hoists, gearing of—1541—H. Phillips.
Railways, permanent way of—1490—J. Edwards.
Railways, permanent way of—1544—W. E. Gedge.
Railway wheels, &c.—1560—J. Whitley.
Rivetting, &c., machinery—1479—J. Bennie, jun.
Roving frames, apparatus applicable to—1532—T. Mayor.
Roving and spinning frames—1562—G. T. Bousfield.
Roving and spinning—1563—G. T. Bousfield.
Textile fabrics, bleaching—1301—J. Baird and J. McIntyre.
Textile materials, preparing or twisting—1421—E. Suckow.
Textile substances, frames for spinning—1444—R. A. Brooman.
Sails for yachts, &c.—1522—S. G. Hewett.
Sewing machines, &c., regulating speed of—1546—A Smith.
Shears, scissors, &c.—1567—G. Carter.
Ships, machinery for steering—1551—E. A. Inglefield.
Spirituous liquors, distilling—1533—W. A. Abegg.
Stays, apparatus for making and finishing—1556—C. Heptonstall.
Steam-engines—1497—W. E. Gedge.
Steam-engines, exhaust and blast pipes of—1553—G. Spencer.
Steam-engine boilers, preventing incrustation in—1529—J. H. Beattie.
Steam-ships, propulsion of—1568—F. Shaw.
Stoves and stove-grates—1526—J. Jobson.
Sulphate of ammonia and sulphuric acid—1545—J. Forbes.
Sulphuric acid—1538—W. J. Pughsley.
Tubes, &c., manufactured from india-rubber, &c.—1508—M. E. Bowra.
Watches, mechanism applicable to—1487—G. Gondelfinger and J. L. Bichet.
Water, apparatus for raising—1548—J. H. Johnson.
Wearing apparel (ladies'), ornamentation of—1503—W. C. Jay.
Woven fabrics, embossing and finishing—1537—M. Radcliffe.

Inventions with Complete Specifications Filed.

Caloric or heated air engines—1664—H. Messer.
Litho-chromolitho-typographic press—1623—H. A. Bonneville.

Patents Sealed.

3291. M. A. Naylor, T. Naylor, and J. W. Naylor.
77. H. M. Nicholls.
78. J. Lane.
79. D. Nickols.
102. J. Wadsworth.
111. W. Tongue.
123. A Shanks.
481. C. Shaw.

From Commissioners of Patents Journal, July 12th.

Patents Sealed.

100. W. Denton & J. Whitaker.
101. W. J. Murphy.
104. J. Rennie.
105. T. W. Plum.
112. A. F. Henery.
117. J. Ellis and J. Sladdin.
118. P. Cato.
124. E. Whele.
128. E. B. Wilson.
132. H. Attwood.
136. R. W. Sievier.
137. Capt. P. St. George Græme and H. Forbes.
145. L. J. Cohen.
147. C. Billson.
148. J. D. Jobin.
153. N. McHaffie.
154. J. Davies.
155. J. Bowns.
157. J. G. Hinde.
158. G. E. Donisthorpe.
169. F. J. Ritchie.
179. W. McAdam.
194. T. Bright.
215. L. Lindley and F. Taylor.
229. J. Gedge.
233. E. Atkins.
254. A. Tozer,
272. J. Clegg, J. Smith, and W. Carnelley.
289. A. J. Walker.
335. J. C. B. Salt.
443. H. C. Gamble.
473. A. Jullienne and J. E. Delacombe.
488. W. E. Gedge.
561. W. Dangerfield.
834. L. Cooke.
952. C. Doughty & W. D. Key.
990. A. C. Fraser.
1050. J. Russell, jun.
1053. H. S. Jacobs.
1314. D. Clark.

Patents on which the Stamp Duty of £50 has been Paid.

1735. A. Priest and W. Woolnough.
1717. R. A. Smith.
1718. T. Wilson.
1749. J. C. B. Salt.
1757. W. B. Adams.
1884. C. E. Amos and J. Francis.
1731. H. Hornsby, jun.
1742. R. Hornsby, jun.
1761. P. J. De Rette.
1778. A. Topham, J. Topham, & J. Topham.
1751. J. R. Cotter.

Patent on which the Stamp Duty of £100 has been paid.

1873. F. C. Hills.
1882. P. A. le Comte de Fontainemoreau.
1889. W. Burgess.
1947. W. E. Newton.
1930. J. Chanter and D. Annan.
1962. W. H. Gauntlett.
1934. J. Loach, J. J. Salt, and B. Day.
1971. J. H. Johnson.
2062. J. Clay.